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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/981,996	10/19/2001	Yasunaga Miyazawa	110824	7093

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EXAMINER	
SKED, MATTHEW J	
ART UNIT	**PAPER NUMBER**
2655	

DATE MAILED: 08/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	09/981,996	MIYAZAWA, YASUNAGA	
	Examiner	Art Unit	
	Matthew J Sked	2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 October 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 4-5, 12, 15-16, 23 and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wymore (U.S. Pat 6,631,348) in view of Wakisaka (U.S. Pat 6,148,105).

Wymore teaches a speech recognition system comprising:

creating speech data on which different types of noise have been superposed (different ambient noise levels, col. 4, lines 1-6);

creating and storing acoustic models according to each of the noise types (col. 3, lines 62-67);

during speech recognition: determining the type of noise superposed on speech data to be recognized (ambient noise level detected by sensor, col. 4, lines 48-49);

selecting the corresponding acoustic model corresponding to the determined noise type (dynamically switch reference pattern, col. 4, lines 49-52); and

perform speech recognition based on the selected model (recognize utterances captured by the device, col. 4, lines 52-57).

Wymore does not teach eliminating the noise using a predetermined noise elimination method in the training and speech recognition processes.

Wakisaka teaches eliminating the noise using a predetermined noise elimination method in the training and speech recognition processes (noise deletion unit, col. 13, lines 29-34).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Wymore to eliminate the noise on the speech signal using a predetermined noise elimination method in training and speech recognition as taught by Wakisaka because it would allow the creation and use of acoustic models that contain clean speech with some residual noise.

3. As per claims 4, 15, and 26, Wymore teaches acoustic models corresponding to types of noise and a plurality of S/N ratios for each noise type (col. 4, lines 18-27). Specifically Wymore teaches different noise levels which inherently suggests the noise levels having different SNRs.

4. As per claims 5, 16, and 27, Wymore does not explicitly teach estimating the S/N ratio from the magnitude of the noise in the noise and the magnitude of speech in the speech segment, but he teaches choosing the acoustic model on noise type estimates of noise features and S/N ratios (noise levels, col. 4, lines 48-52).

5. Claims 2, 13, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wymore in view of Wakisaka as applied to claims 1, 12, and 23 above, and taken in further view of Hermansen (U.S. Pat 6,510,408).

Wymore teaches a feature analysis to obtain feature data required in speech recognition when speech is detected (acoustical information, col. 4, lines 44-47).

Wymore and Wakisaka do not teach a first feature analysis to obtain frequency-domain feature data for determining if the speech data is a noise segment or a speech segment.

However, Hermansen teaches a speech recognition system that performs a feature analysis to obtain frequency-domain feature data for determining if the speech data is a noise segment or a speech segment (estimate of noise power spectrum, col. 3, lines 55-57).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Wymore and Wakisaka to include a first feature analysis to obtain frequency-domain feature data for determining if the speech data is a noise segment or a speech segment as taught by Hermansen because it would allow analysis to be done on the signal in the frequency domain, which allows for easier noise detection.

Wymore and Wakisaka do not teach using a spectral subtraction method in the noise eliminating processes nor do they teach storing feature data when noise is detected.

However, Hermansen teaches a system for reducing noise in speech signal that uses spectral subtraction for removing the noise from the speech signal for use in creating an acoustic model (col. 3, lines 55-67 and col. 4, lines 1-2). Also Hermansen teaches storing feature data when noise is detected (col. 3, lines 55-57). Specifically he

teaches calculating the noise power spectrum during speech free periods. This shows that during periods where noise is detected the features of the noise must have been stored or buffered in order to calculate the noise power spectrum.

It would have been obvious to one of ordinary skill in the art at the time of invention to use spectral subtraction in the noise eliminating processes because it enables an improved noise reduction compared to other methods known in the art (col. 1, lines 60-64).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Wymore and Wakisaka to store the feature data of the signal when noise is detected as taught by Hermansen because it would allow for better noise detection and elimination by having current feature data of the noise.

6. Claims 3, 14, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wymore in view of Wakisaka as applied to claims 1, 12, and 23 above, and taken in further view of Takagi (U.S. Pat 5,890,113).

Wymore does not teach storing feature data when noise or the speech is detected.

Wakisaka teaches storing feature data when noise is detected (no announcement voice, col. 14, lines 7-12) and storing feature data when speech is detected (sound feature extraction to create model and model is stored, col. 14, lines 13-28).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Wymore to store the feature data of the signal when

noise or speech is detected as taught by Wakisaka because it would allow for better noise detection and elimination by having current feature data of the signal.

Wymore and Wakisaka do not teach a feature analysis to obtain a vector of cepstrum coefficients for use in detecting noise.

Takagi teaches extracting cepstrum coefficients from the sequence for speech recognition (analyzing unit, col. 7, lines 15-20) and uses it to detect noise (speech parts, col. 7, lines 44-46).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Wymore and Wakisaka to extract cepstral features from the signal to be recognized as taught by Takagi because cepstral coefficients have highly desirable properties for speech recognition and classification.

Wymore and Wakisaka do not teach using cepstrum mean normalization method in noise elimination.

Takagi teaches using the cepstrum mean normalization to extract noise from an inputted speech signal in a speech recognition system (environmental adapting unit, col. 7, lines 37-40).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Wymore, Rao Gadde, and Hermansen to eliminate the noise through cepstrum mean normalization because it is a common approach used for compensating for multiple distortions in a speech signal.

7. Claims 6-8, 17-19, and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wymore in view of Hermansen and further in view of Takagi.

8. As per claims, 6, 17, and 28, Wymore teaches a speech recognition system comprising:

creating speech data on which different types of noise have been superposed (different ambient noise levels, col. 4, lines 1-6);

creating and storing acoustic models according to each of the noise types (col. 3, lines 62-67);

during speech recognition: determining the type of noise superposed on speech data to be recognized (ambient noise level detected by sensor, col. 4, lines 48-49);

selecting the corresponding acoustic model corresponding to the determined noise type (dynamically switch reference pattern, col. 4, lines 49-52); and

perform speech recognition based on the selected model (recognize utterances captured by the device, col. 4, lines 52-57).

Wymore does not teach eliminating noise by spectral subtraction.

Hermansen teaches a system for reducing noise in speech signal that uses spectral subtraction for removing the noise from the speech signal for use in creating an acoustic model (col. 3, lines 55-67 and col. 4, lines 1-2).

It would have been obvious to one of ordinary skill in the art at the time of invention to use spectral subtraction in the noise eliminating processes because it enables an improved noise reduction compared to other methods known in the art (col. 1, lines 60-64).

Also Hermansen teaches storing feature data when noise is detected (col. 3, lines 55-57). Specifically he teaches calculating the noise power spectrum during speech free periods. This shows that during periods where noise is detected the features of the noise must have been stored or buffered in order to calculate the noise power spectrum.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Wymore to store the feature data of the signal when noise is detected as taught by Hermansen because it would allow for better noise detection and elimination by having current feature data of the noise.

Wymore and Hermansen do not teach using a cepstrum mean normalization method to obtain feature vectors.

Takagi teaches using the cepstrum mean normalization to extract noise from an inputted speech signal in a speech recognition system (environmental adapting unit, col. 7, lines 37-40).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Wymore and Hermansen to eliminate the noise through cepstrum mean normalization as taught by Takagi because it is a common approach used for compensating for multiple distortions in a speech signal.

Wymore and Hermansen do not explicitly teach using cepstrum coefficients in detecting noise.

Takagi teaches extracting cepstrum coefficients from the sequence for speech recognition (analyzing unit, col. 7, lines 15-20) and uses it to detect noise (speech parts, col. 7, lines 44-46).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Wymore and Hermansen to extract cepstral features from the signal to be recognized as taught by Takagi because cepstral coefficients have highly desirable properties for speech recognition and classification.

9. As per claims 7, 18, and 29, Wymore teaches acoustic models corresponding to types of noise and a plurality of S/N ratios for each noise type (col. 4, lines 18-27). Specifically Wymore teaches different noise levels which inherently suggests the noise levels having different SNRs.

10. As per claims 8, 19, and 30, Wymore does not explicitly teach estimating the S/N ratio from the magnitude of the noise in the noise and the magnitude of speech in the speech segment, but he teaches choosing the acoustic model on noise type estimates of noise feature and S/N ratio (noise levels, col. 4, lines 48-52).

11. Claims 9, 10, 20, 21, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gadde (U.S. Patent Applicantion Pub. 2003/0036902) in view of Wakisaka.

Gadde teaches a speech recognition system comprising:

creating speech data on which a particular noise with different S/N ratios has been superposed (noise energy changed at different SNRs, para 27);

creating acoustic models corresponding to the S/N ratios (SNR-Weight table, para 27);

determine the S/N ratio on speech data to be recognized (para 26);

select the corresponding acoustic model (look up table of SNR weight pairs, para 26); and

performing speech recognition (identify most likely sequence of words that produced the speech signal, para 21).

Gadde does not teach eliminating the noise using a predetermined noise elimination method in the training and speech recognition processes.

Wakisaka teaches eliminating the noise using a predetermined noise elimination method in the training and speech recognition processes (noise deletion unit, col. 13, lines 29-34).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Gadde to eliminate the noise on the speech signal using a predetermined noise elimination method in training and speech recognition as taught by Wakisaka because it would allow the creation and use of acoustic models that contain clean speech with some residual noise.

12. Regarding Claims 10, 21, and 32, Gadde does not teach using a spectral subtraction method in the noise eliminating processes.

However, Wakisaka teaches a system for reducing noise in speech signal that uses spectral subtraction (col. 15, lines 43-50).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Gadde to use spectral subtraction in the noise eliminating processes as taught by Wakisaka because it enables an improved noise reduction compared to other methods known in the art (col. 1, lines 60-64).

13. Claims 11, 22, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gadde in view of Wakisaka as applied to claims 1, 21, and 32 above, and further in view of Takagi.

Gadde and Wakisaka do not teach using cepstrum mean normalization method in noise elimination.

Takagi teaches using the cepstrum mean normalization to extract noise from an inputted speech signal in a speech recognition system (environmental adapting unit, col. 7, lines 37-40).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the system of Gadde to eliminate the noise through cepstrum mean normalization because it is a well-known and convenient approach for compensating for multiple distortions in a speech signal.

Priority

14. Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Rahim (U.S. Pat 5,960,397), Wakisaka et al. (U.S. Pat 5,917,944), Sih et al. (U.S. Pat 6,381,569), Hwang et al. (U.S. Pat 6,449,594), Takebayashi et al. (U.S. Pat 5,761,639), and Cope et al. (U.S. 6,529,866) all teach systems for speech recognition in noisy environments.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Sked whose telephone number is (703) 305-8663. The examiner can normally be reached on Mon-Fri (8:00 am - 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Talivaldis Smits can be reached on (703) 306-3011. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MS
07/27/04

W. R. YOUNG
PRIMARY EXAMINER